

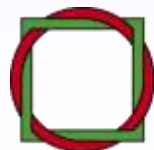


Towards a fuller picture of the resource basis of our economies - An introduction

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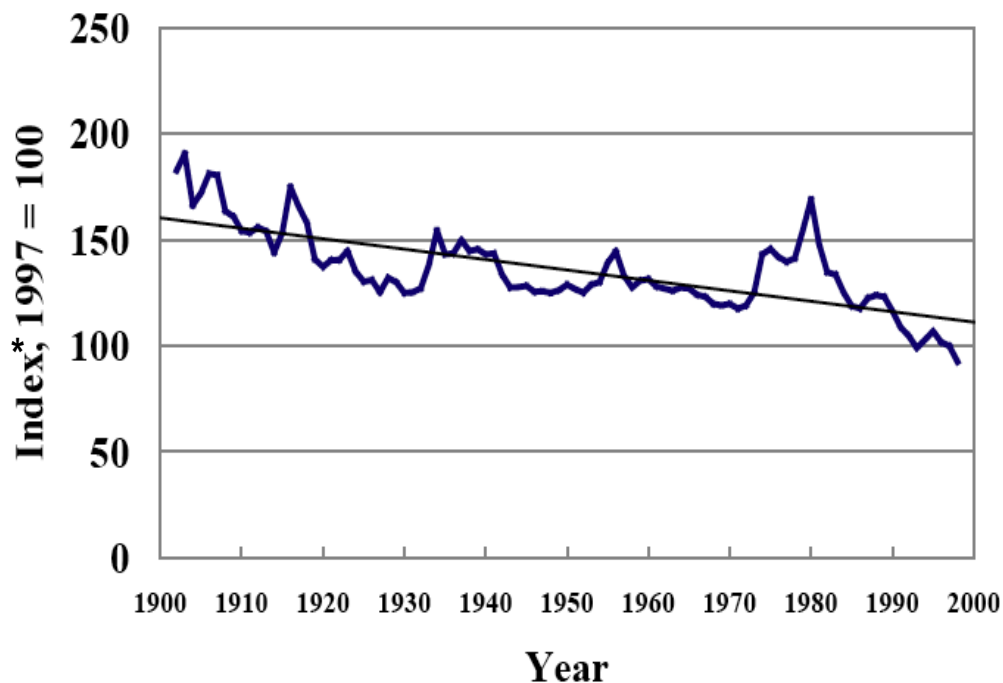


Wuppertal Institute
for Climate, Environment
and Energy

The introduction

- Why care about resources?
- The OECD process on Material Flows and Resource Productivity
- Overview: the "systems perspective"
- Highlighted trends

Commodity prices fluctuate



*copper, gold, iron ore, lead, zinc, cement, clay, crushed stone, lime, phosphate rock, salt, sand and gravel

Short-term trend boosting

Zur Anzeige wird der QuickTime™ Dekompressor „TIFF (Unkomprimiert)“ benötigt.

Long-term trend declining

Source: Sullivan et al. USGS open file report 00-389

Source: OECD, based on World Bank (2008), World Bank Commodity Price Data (projections as of Dec 20, 2007) and Global Economic Prospect (2008)

Material costs still to be realized

In German manufacturing industries, material costs amount to about **40% of total production costs**

This does not yet include any externalities



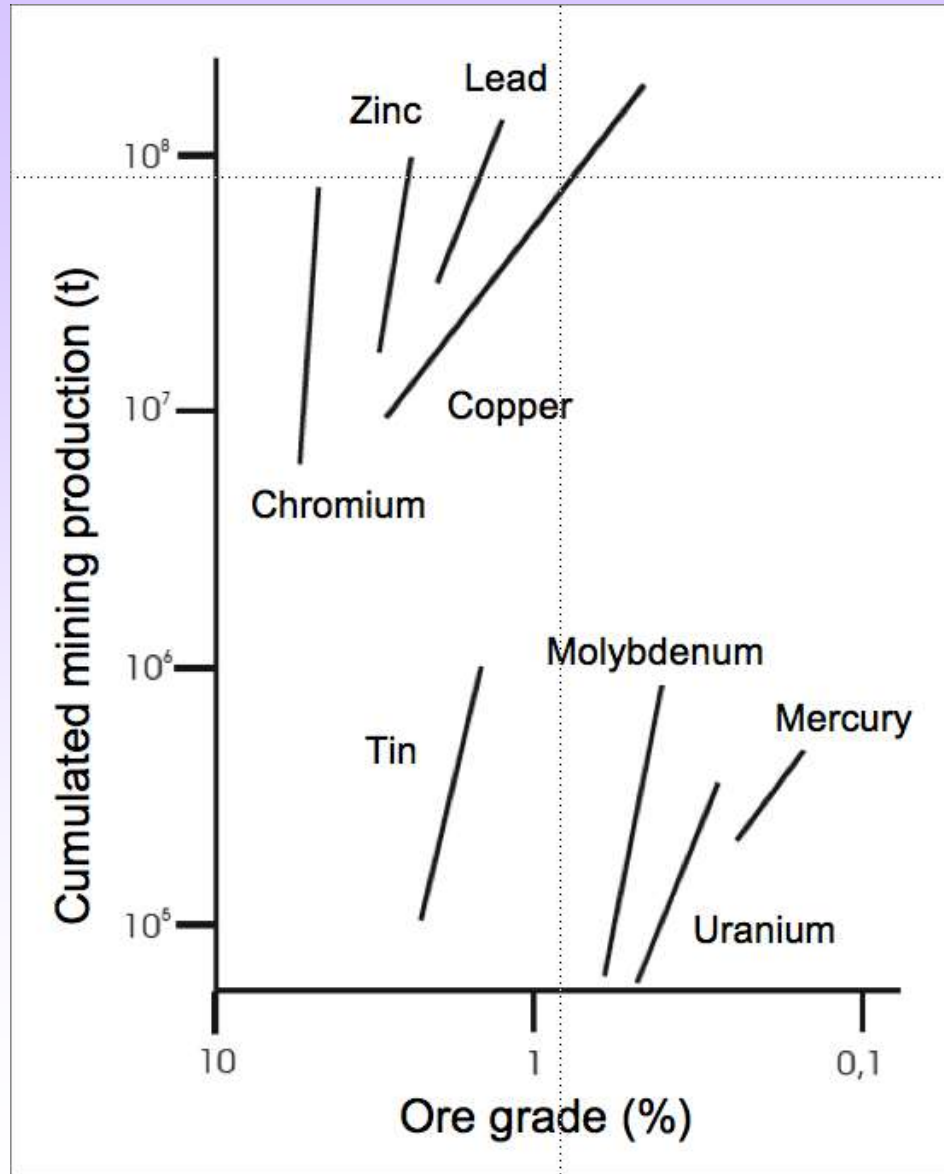
Environmental Impact of Copper Mine Ok Tedi Mine, Papua New Guinea



These images show environmental impact of the mine

- 1990: Both the mine and township of Tabubil, are clearly visible
- 2004: Raised river beds, forest damage and decline in biodiversity are some impacts

Ever decreasing ore grades are going to be used



Source: U. Dörner after
PreConsultants 2002

Unused extraction and mining waste

...are therefore
expected to grow



Sources:

http://www.spreewald-info.com/tour_tagebaue.html 1999-2002 AOD-Media
Sonja Valivia (2004), Foto Edga Llamoca



Conversion of forests into palm plantations in Papua, Indonesia



- 1990: a new human presence, earth colored roads provide access to the forest
- 2000: rectilinear patterns cover 10,000 ha
- 2002: Cleared area nearly doubles since 2000

Structure and volume of TMR unsustainable

(t/cap)

Continuous global change through dominance of non-renewables

Component	EU-15	USA	Japan
	1997	1994	1994
Domestic used extraction	16	23	10
Imports	4	3	6
Sum (=DMI)	19	25	16
Domestic HF	15	57	10
Foreign HF	16	3	20
Sum (=TMR)	51	85	45
Renewable Proportion (%)	12	7	6
Share for energy supply (%)	29	37	28
Domestic share (%)	61	93	44

Global adoption of industrial countries' resource requirements would increase earth crust transformation 2-5 times

Country	Period	TMR per capita			TMC per capita			TMC as % of TMR			Source
		Median	Min	Max	Median	Min	Max	Median	Min	Max	
USA	1991	84			74			88			Adriaanse et al. 1997
Germany	1991	90			74			83			Adriaanse et al. 1997
Finland	1970-99	78	64	98	48	40	59	62	47	74	Mäenpää and Juutinen 1999, 2001
Netherlands	1975,80,85,90-93	69	62	76	55	48	64	84	68	85	Adriaanse et al. 1997
Denmark	1981,90,97	66	55	70	43	41	48	72	61	75	Pedersen 2002
United Kingdom	1970-99	37	34	43	31	27	34	83	72	90	Bringezu and Schütz 2001
West Germany	1970,77,80,82,84,87,89-90	67	60	74	45	43	53	69	64	71	Bringezu and Schütz 1995

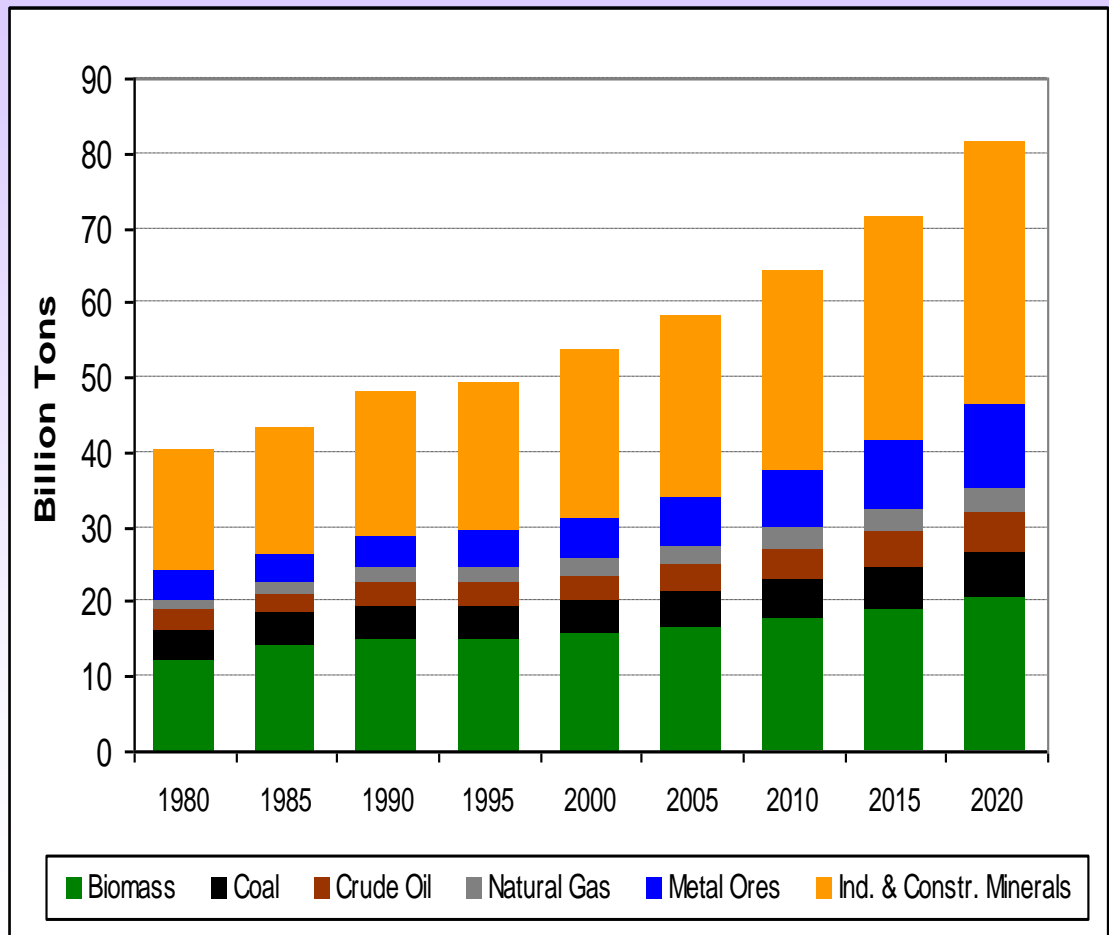
Source: Different sources and Bringezu und Schütz 2001

Worldwide used extraction of resources

Projected increase of used extraction from 2000 to 2020: 1,5 times

Unused extraction adds at least the same amount*

MOSUS Baseline scenario DEU



Source: SERI; Giljum et al. 2007

*not shown

Thus we need to increase resource productivity

- to reduce costs
- to enhance security of supply
- to mitigate environmental pressure
- to cope with growing world demands
- to compensate for bio-geo-physical limitations

The OECD process: Measuring material flows and resource productivity

- Various MFA activities since early 1990
- OECD process starting 2003 (Tokyo)
- Council Recommendation 2004
- Series of workshops (Helsinki, Berlin, Rome, Tokyo)
- Products:
 - Synthesis report
 - Vol. I: The OECD guide
 - Vol. II: The accounting framework
 - Vol. III: Inventory of country activities (coop. with EEA)
 - Vol. IV: Implementing national MF Accounts ("guide light", jointly with Eurostat)

Questions addressed by material flow based indicators

- What are the material requirements of an activity or an economy?
- How dependent is an activity or an economy on external material inputs or external material markets?
- How efficiently are material resources being used?
- What is the potential for improving resource productivity?
- What are the main environmental risks and pressures associated with material resource use?
- What are the main environmental consequences of international material flows?

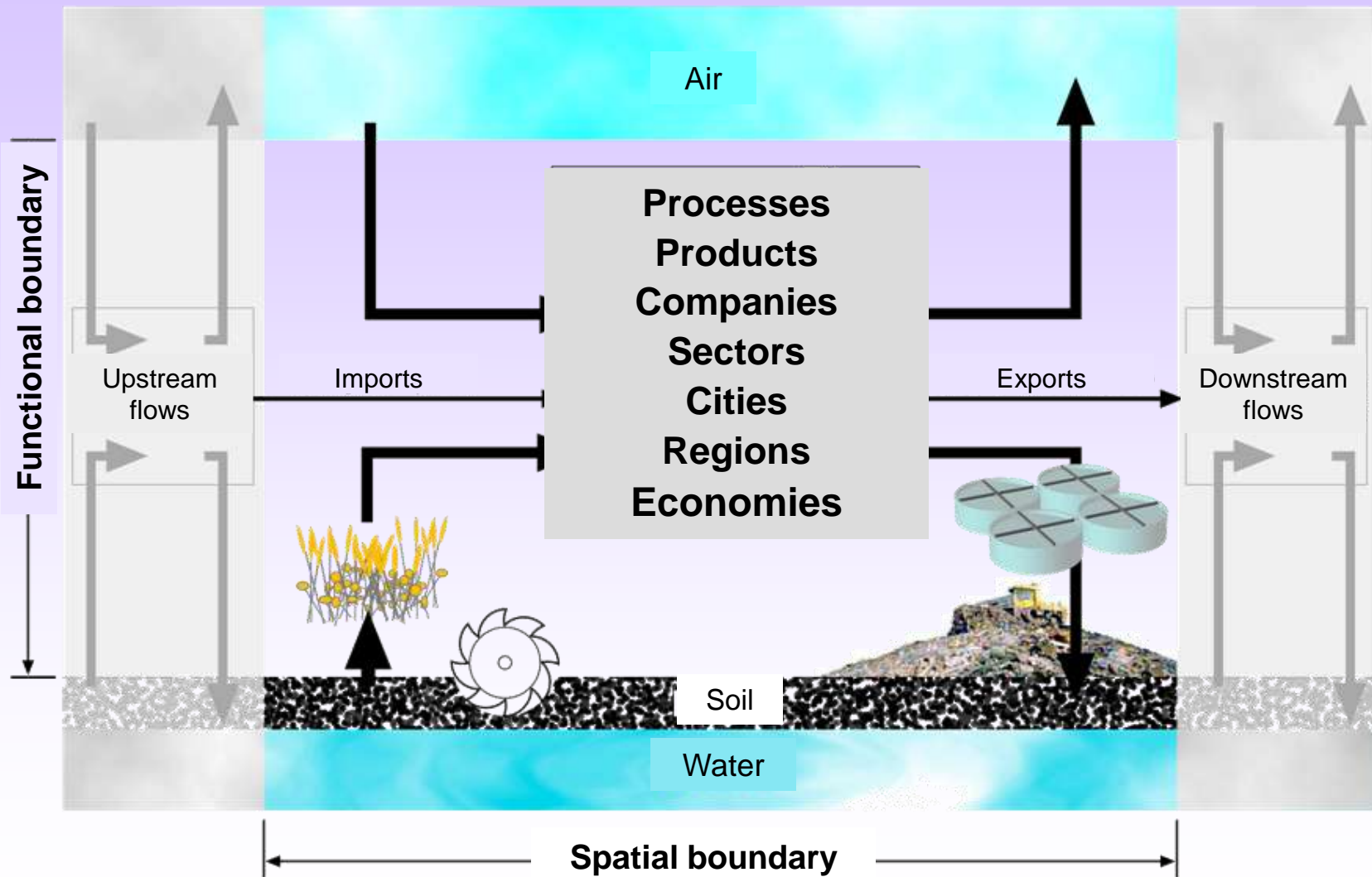
A basic perspective

Nature & Environment



Source: Stefan Bringezu

Systems perspective(s) on the metabolism



Source :Stefan Bringezu

Types of material flow related analysis

Specific environmental problems related to certain impacts per unit of flow of

Substances	Materials	Products
e.g.	e.g.	e.g.
Cd, Cl, Pb, Zn, Hg, N, P, C, CO2, CFC	wooden products, energy carriers, excavation, biomass, plastics	diapers, batteries, cars

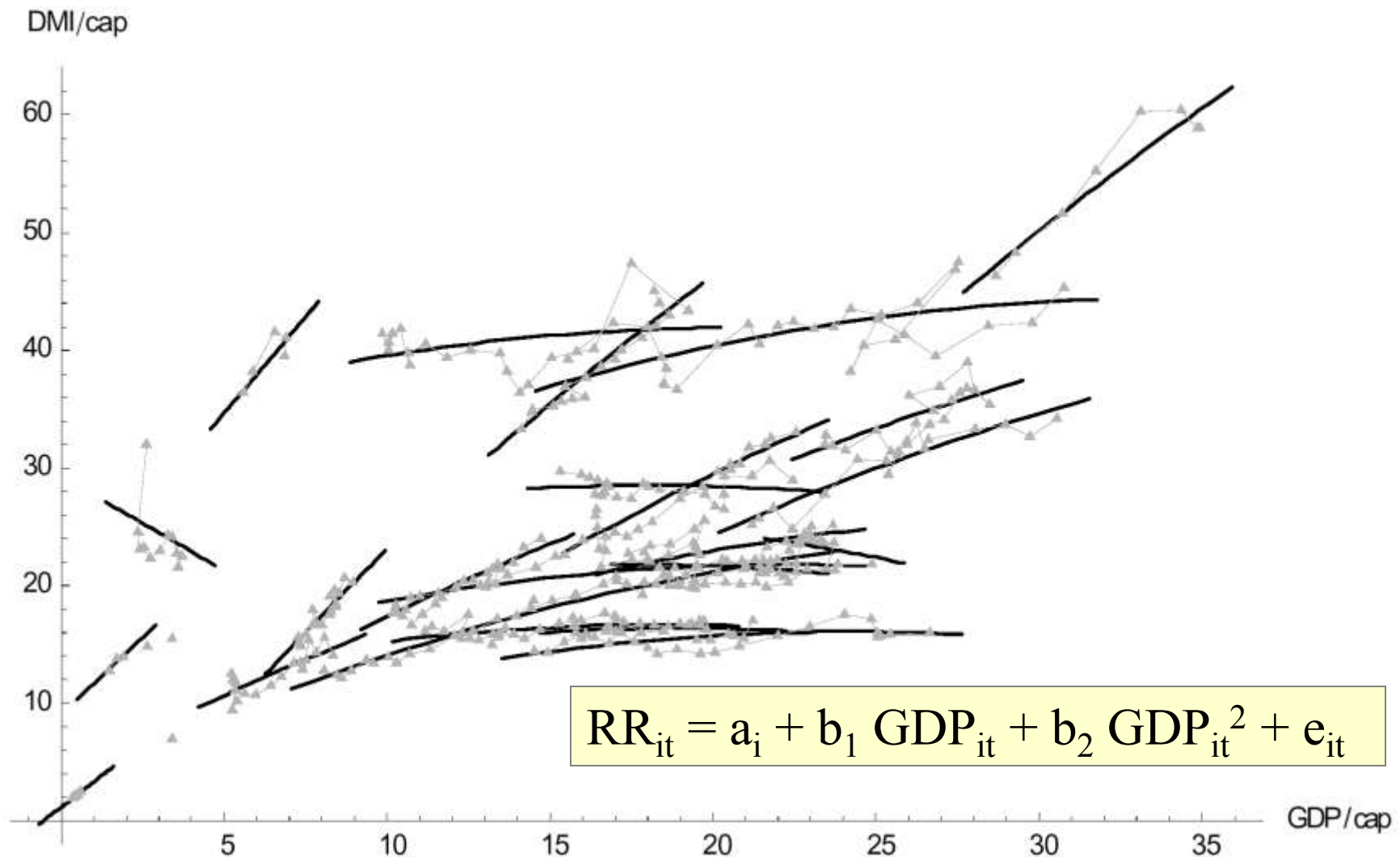
within certain firms, sectors, regions

Problems of environmental concern related to the throughput of

Firms	Sectors	Regions
e.g.	e.g.	e.g.
single plants, medium and big companies	production sectors, chemical industry, construction	total or main throughput, mass flow balance, total material requirement

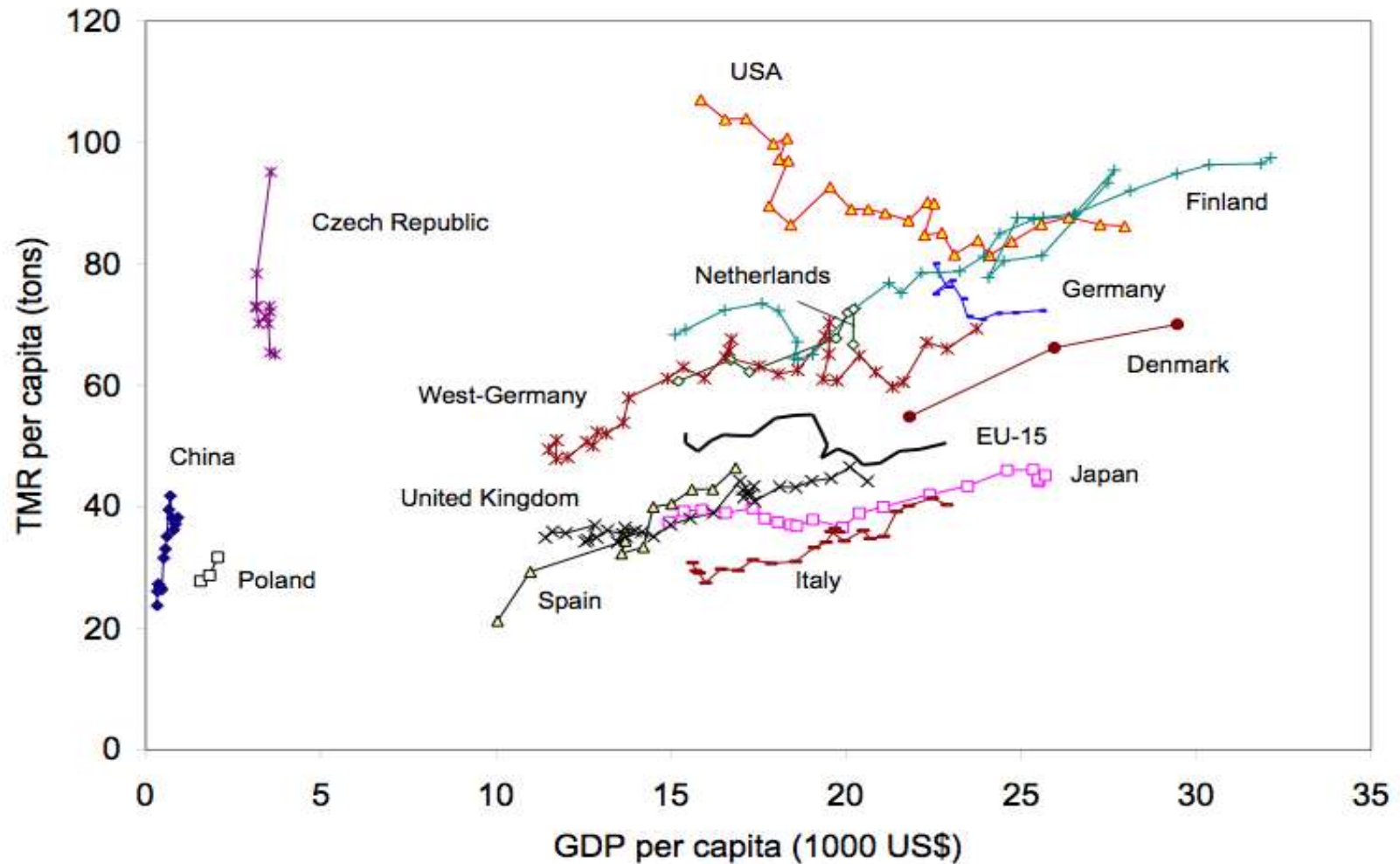
associated with substances, materials, products

DMI and GDP: no general trend of absolute decoupling

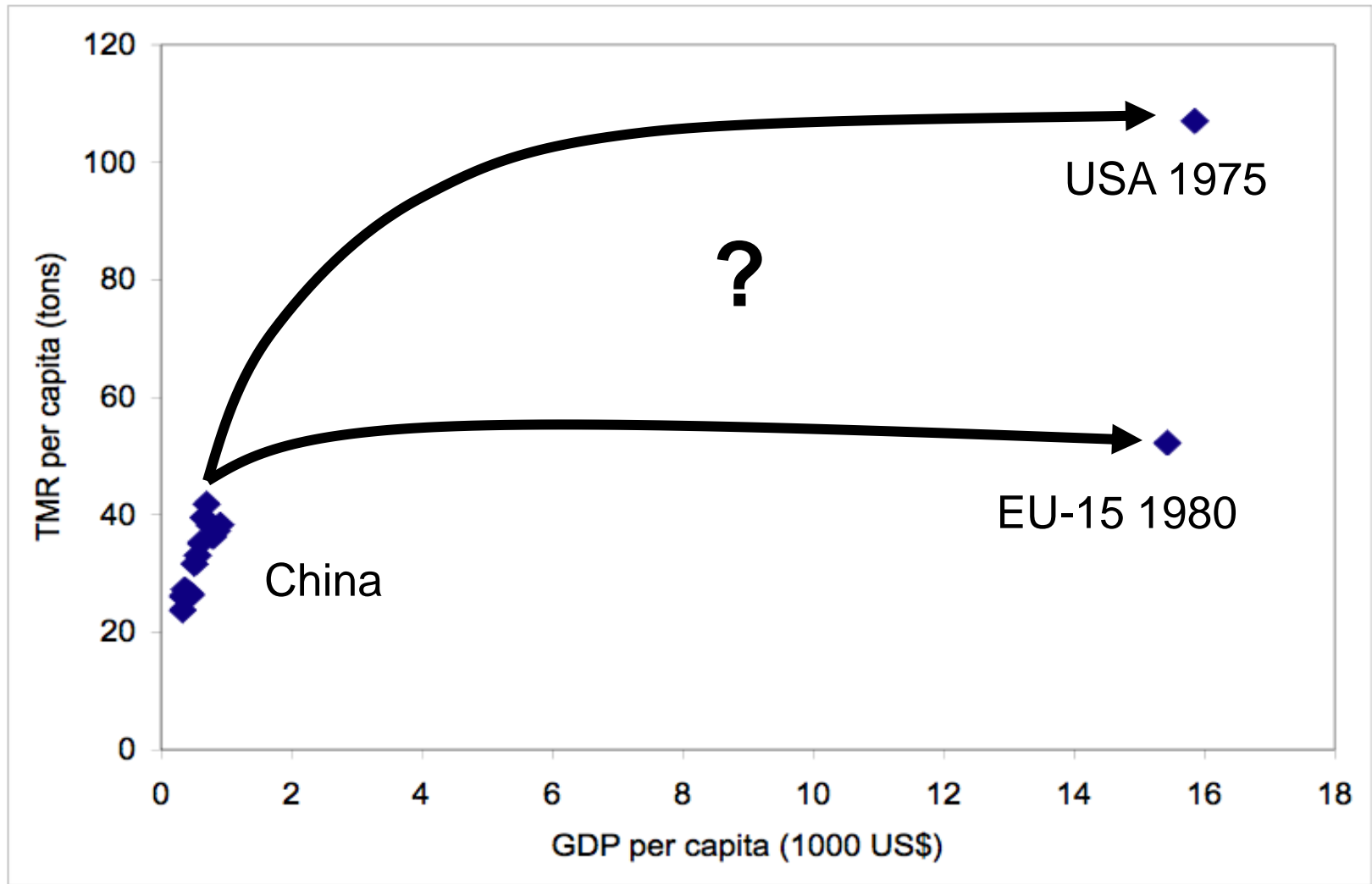


Source: Bringezu, S., et. al. 2004

Total Material Requirement and economic growth

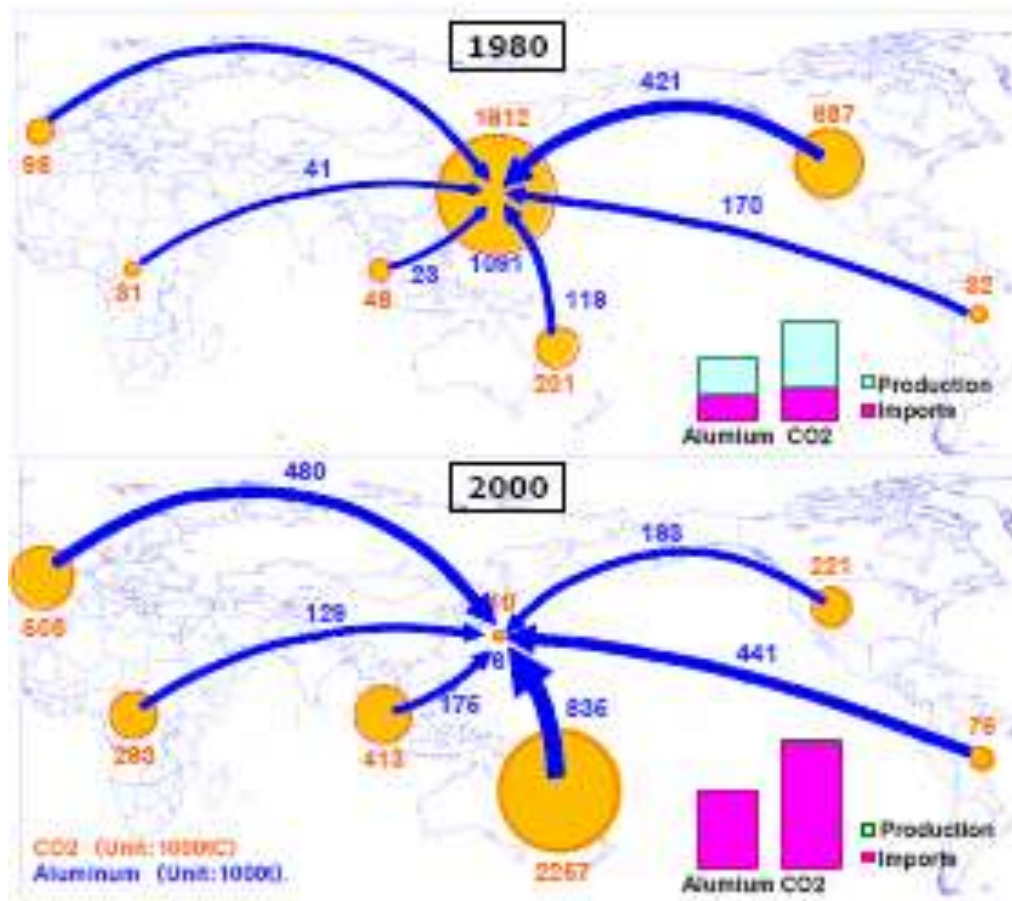


Which way is China going to take?

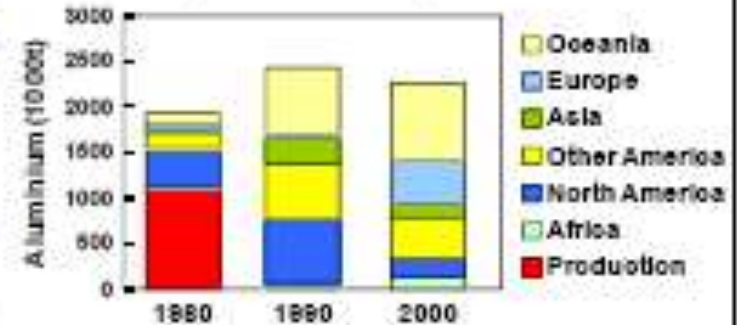


The importance of indirect flows is growing

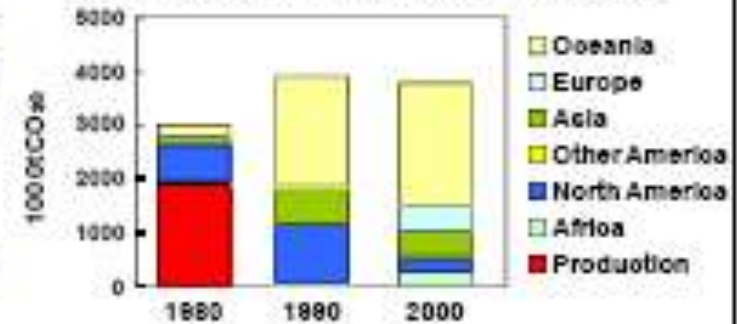
Domestic production and import of primary Aluminium and related CO2 emissions, 1980-2000, Japan



Domestic production and import of Aluminium



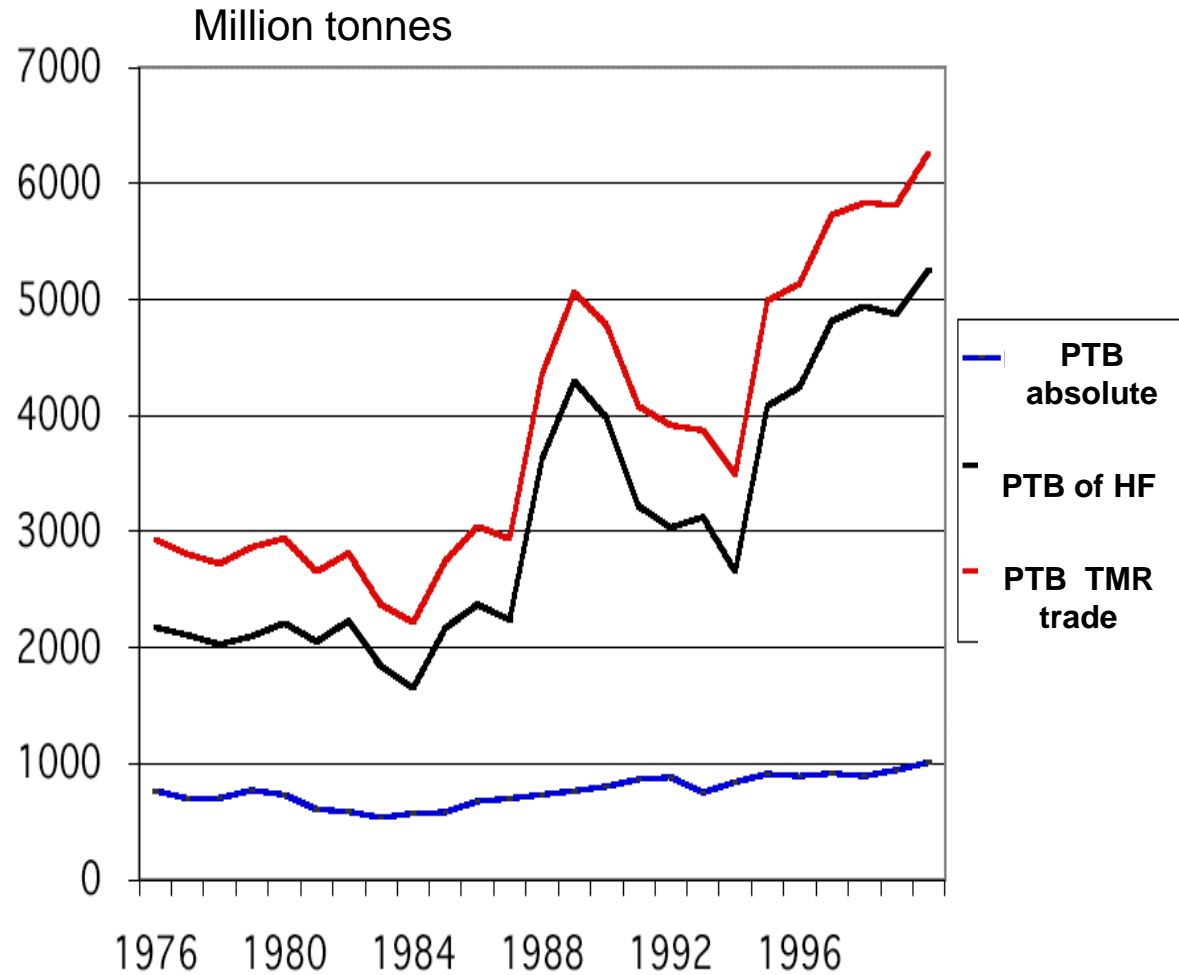
CO2 emissions for Aluminium requirements



Source: NIES

Physical trade balance of EC/EU considering hidden flows

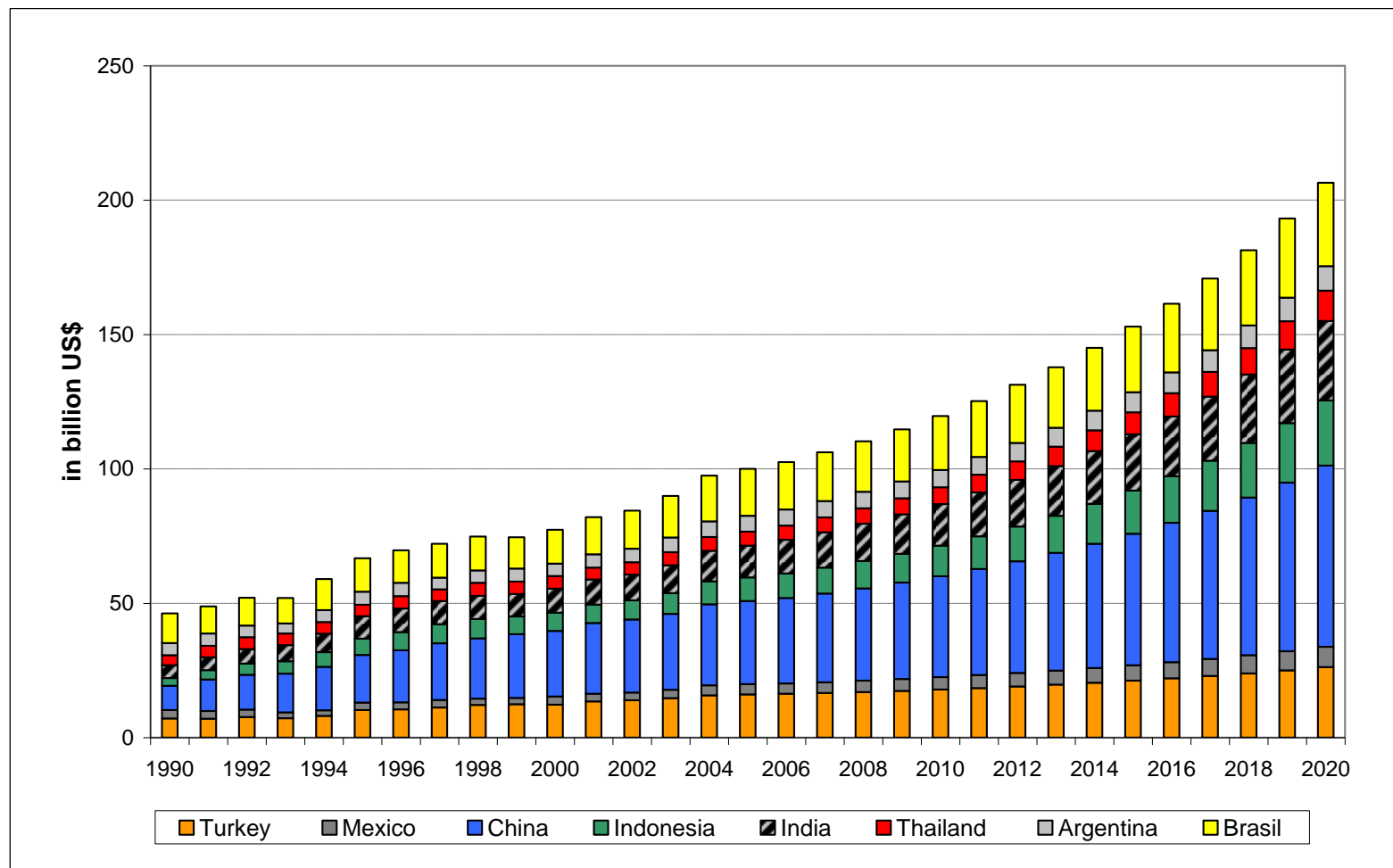
The EU increasingly uses foreign resources (import surplus)



Source: Schütz et al (2003)

Industrial regions: Resource intensive imports will increase

Resource-intensive imports from “Anchor countries”- MOSUS baseline EU-25



Source: SERI; Giljum et al. 2007

The MFA toolbox allows

- an **integrated view** of the resource basis of the economy
- capturing **flows that do not enter the economy** but are relevant
- reveal **shifts within and between countries**
- examine the **overall effect of** and trade-off between **policies**
- considering **interrelationships** in the economy and with the environment, **across** different **media and sectors**

So we have the chance to

- further **use the toolbox** and measure material use and productivity at various levels
- explore the technological and institutional **potentials for improvement**
- build a **vision of our future resource basis**
- develop practises and policies for **global sustainable resource management**

**Thank you for your attention
and enjoy the conference**

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